DOCUMENT RESUME

ED 332 268 EA 021 730

AUTHOR Geisert, Gene; Dunn, Rita
TITLE Learning Styles and Computers.
PUB DATE 90
NOTE 14p.
PUB TYPE Information Analyses (070)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cognitive Style; Computer Literacy; Computer Managed Instruction; Computer Software Reviews; *Computer Uses in Education; Courseware; Elementary Secondary Education; Learning Modalities; *Learning Strategies; Writing Skills

ABSTRACT

Although the use of computers in the classroom has been heralded as a major breakthrough in education, many educators have yet to use computers to their fullest advantage. This is perhaps due to the traditional assumption that students differed only in their speed of learning. However, new research indicates that students differ in their style of learning as well--some preferring visual information; others, auditory or tactile. A new generation of computer software that can be tailored to a student's preferences has been developed, and its use in the classroom has yielded dramatic results. For instance, Thinking Networks has developed a program designed to help improve writing skills--skills that are notoriously poor among many students. By presenting nonverbal graphic images that symbolize semantic relationships, this program is immediately accessible to many visually-oriented students. The program also develops basic thinking operations, such as sequencing, organizing, comparing, and contrasting, and can be tailored to students' preferences in a number of other ways as well. Through the thoughtful use of computers and Computer Managed Instruction, technology can serve the needs of education in a way no other tool can. (RJS)

**********
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
**********

ED332268

# Learning Styles and Computers

by

Gene Geisert and Rita Dunn

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Gene Geisert

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

PROFESSORS GENE GEISERT and RITA DUNN are in the Division of Administrative and Instructional Leadership, St. John's University, New York. Dr. Dunn also directs the University's Center for the Study of Learning and Teaching Styles in which Dr. Geisert coordinates administrative institutes and workshops. Their combined publications include more than nine books and 300 articles, research papers, and monographs.

EA 021 730

BEST COPY AVAILABLE

# Learning Styles and Computers

By

Gene Geisert and Rita Dunn

Educational computing was proclaimed as a technology that would make a difference in the way children learned. By letting the student proceed at his/her own speed, and serving as a tireless tutor in basic skills that the student could call upon anywhere, anyplace and at anytime, it was thought that learning could accelerate to new levels. In part this was true because computers have the flexibility and capacity for individualizing instruction by permitting ongoing active involvement of students, evaluating their responses and adapting instructional strategies that meet individual needs, levels of achievement, and specific interests. Today, those original concepts have been expanded to include the concept of using the computer as a tool that will enable students to organize and process work at a pace not thought of by previous generations. Unfortunately, too few teachers are making use of the computer as an instructional tool and even fewer are exploring the vast potential of the computer as a means to accommodate the preferred learning style of individual students.

Although drill and practice and certain thinking skills programs (Logo) represented a gallant early attempt to fulfill the promise of computing in education, when used as a total approach, they missed an important point. Computer assisted instruction traditionally assumed that the students differed only in their speed of learning, not in their intrinsic styles of learning. New research is finding evidence that will reshape the way we view learning and, consequently, the way we use educational software.

Educators have only recently recognized that an understanding of the way students learn is an important factor in improving educational opportunities for students. Between 1967 and 1978, the Dunns (1978) launched a series of studies of the preferred ways in

which students began to concentrate, process, internalize, and retain new and difficult information. During the past decade, research conducted at more than 60 institutions of higher education concluded that, when faced with mastering new and difficult information or tasks, individuals have unique learning styles (Annotated Bibliography, 1990). Dunn, Dunn, and Price (1985) defined learning style in terms of individual student reactions to 21 elements of instructional environments: (a) immediate environment (noise level, temperature, light and design) (Dunn, 1987); (b) emotionality (motivation, persistence, responsibility, and structure); (c) grouping preferences (learning alone or with peers, learning with adults present, learning in combined ways, being motivated by the teacher and being motivated by a parent); (d) physiological characteristics (auditory, visual, tactual, and kinesthetic perceptual preferences, time of day energy highs or lows, intake, and mobility); and (e) psychological inclinations (global/analytic, hemispheric preference, and impulsive/reflective).

**[Insert table on Learning Styles]**

## Research Implications for Computer Instruction

As noted above, research is just starting to catch up with the concept of studying the relationships between computer assisted instruction and learning preferences. In one important study, Martini (1986) investigated the effects of matching and mismatching instructional methods on the science achievement test scores of students according to their learning style perceptual preferences (auditory, tactual, or visual). She also examined the effect three different instructional strategies (listening to a cassette, manipulating a computer and reading printed materials) had on students learning a science lesson and their attitude toward the various instructional methods used. In keeping with other non computer focused learning style research (Annotated Bibliography, 1990), data revealed that when students were matched and mismatched with instructional strategies that were complementary to and dissonant from their perceptual preferences, achievement and attitudes toward studying increased statistically. Of even greater interest for our purposes is

the fact that although:

(1) auditory-preferenced students achieved statistically better with the taped materials than the visual and tactual students;

(2) visually-preferenced students achieved statistically better with the reading materials than the auditory and tactual students;

(3) tactual students who, historically are the underachievers in schools, achieved statistically better with the computer than the auditory and visual students;

(4) all students achieved statistically higher test and attitude scores toward learning science (.001) with computer assisted instruction.

Thus, Martini's data verified the effectiveness of matching individuals' perceptual preferences with complementary instructional methods and the value of Computer Assisted Instruction. Her results, that all students achieved better when taught with CAI than with auditory (listening to speech) or visual (reading) methods, support the theory that the computer can be an especially powerful tool when used appropriately.

## Application of Research Findings

In addition to all the other attributes of CAI already discussed herein, computers are uniquely able to introduce new and difficult information through an individuals' perceptual preferences and then reinforce that information through their secondary or tertiary preferences. Thus, although all students may experience identical computer programs in the same topic, sequencing or branching of the various sections of the program can be made responsive to each individuals' strengths.

In terms of the Dunns' learning style elements, computers can be made complementary to preferences for subdued sound or quiet, dim or bright light, temperature comfort levels, and a formal design. They could prove to be motivating to certain students who enjoy working on their own, with or without extensive teacher-direction, at

their own pace, and with or without frequent breaks. Computers provide for multisensory learning and, as indicated above, can be sequenced to provide the appropriate complementary introductions to, and reinforcements of, knowledge as recommended by Martini's (1986) and Kroon's (1985) data. Software programs, for the most part, are written analytically: what remains, is for programmers to become aware of the characteristics of global learning so that information then can be programmed globally.

To be more specific and direct, computers can be used through each student's sociological preferences-- alone, in pairs, in a team, or with adult supervision in the lab or in classroom settings. More than merely sequencing through primary and secondary perceptual strengths, computers also can require that programs respond to tactual preferences--through use of a joy stick, mouse, electronic pad, or standard keyboard in imputing data. They can be programmed to speak to auditory students, present material in printed form, like a book, for the visual analytic, and provide pictures, illustrations, symbols, and other graphic representations for visual global processors. They certainly address emotional concerns through action, color responsiveness, and feedback, and can be designed to require the user to be either more persistent to achieve success--or to take needed breaks and return for mastery. Finally, the user can approach the computer either with a great sense of individual responsibility and explore the universe or be placed into a highly structured environment, such as programmed learning, and receive needed direction.

One of the advantages computers have over teachers is that they are functional morning, noon, and night and, thus, are responsive to individual chronobiological highs and lows. In fact, their only drawback to flexibility and motivation is that, once hooked, the student may become a computer hacker and to the obstruction of other pursuits, spend great amounts of time at the keyboard.

As pointed out above, computers are tailor-made for individual instruction, not only the self-paced learning we take for granted , but for teaching aimed at each child's style of learning. Much of this breakthrough has been made possible by the excellent quality of the

newer collections of educational courseware. To fully realize the potential of these new generation programs however, teachers and supervisors need to examine not only which skills a particular program develops, but also the particular type of learning style to which it responds. Some programs will address directly, a child's dominant style while others will develop or enhance only his/her secondary or tertiary preferences. The computer is a remarkably flexible teaching tool that utilizes a wide range of teaching strategies. But even more, the use of the computer as an instructional tool places into the hands of children a new revolutionary power. When combined with appropriate software the result can be awesome.

Applications to Instructional Resources

The National Assessment of Educational Progress (NAEP) reports flatly stated that students do not write well. Asked to write an imaginative description, between 80 percent and 95 percent of the nine-year olds tested could not do so adequately." "The Writing Report Card: Writing Achievement in American Schools, provided even more dismaying information. (Applebee, Langer, and Mullin, 1986.) Their survey of 55,000 students across the U.S. showed that, depending on the type of writing called for, only between 20 and 30 percent of the students performed adequately. One possible reason for this can be found in another section of the NAEP study where 12 percent of eighth graders and 9 percent of eleventh graders reported doing no in-school writing at all during the year under study.

The Department of Education also released a report containing the following typical eighth-grade writing sample:

> "I think our school does not need A laboratory rule because some time people have to go and they would let you and then when your doing your work one of the teachers happen to get up and mosy on out to the restroom to go to the bathroom just after she or he told you your not alound to go to the rest room."

St. John's University faculty have responded to these documented needs by applying research findings and the knowledge of computer expertise to the development of instructional technology

for students who have not heretofore responded well to conventional teaching. For example, Think Networks, a global software program, teaches students the critical survival skill of effective writing in this age of the information society. This almost forgotten subject in the trilogy of reading, writing and arithmetic is one of the most neglected areas in present day schooling.

The Think Network software, which incorporates concepts of learning style and computer/teacher/student interaction, goes a long way toward eliminating the writing problems noted above. In this new process, teachers using computers and specialized materials, helped their students to think more creatively about topics under study, organize elements of written structure, and use that structure to become better writers. It represents one of several promising new approaches designed to confront the problems surrounding the teaching of writing, thinking and reading.

## THINKINGNETWORKS

Thinking Networks is a breakthrough program in the teaching of reading and writing. Using the microcomputer as a basic tool for the teacher, the software interacts with students and shows them how to attack problems in a holistic manner. In Thinking Networks, students conceptualize, organize, and concentrate at varying levels of abstraction. Basic thinking operations such as sequencing, describing, comparing, contrasting, and classifying occur naturally within the program. Higher level thought processes, such as applications of new word meanings, synthesis, composing and organizing through written discourse, occur when students restructure text and write original compositions. The networking component of Thinking Networks makes use of nonverbal graphic design features to explain how text is organized. Students whose style of learning tends to be strongly influenced by right-preferenced, global processing perform particularly well with this program. The program also accommodates the sociological elements of working alone, in pairs, with peers, in a team setting and/or with adult help.

In Thinking Networks, students are led through the constructing of network relationships via graphic maps so they can both see and understand how different types of text structures are

organized. Seeing the way an article is composed does make a difference. These graphic displays known as semantic networks, advanced organizers, or maps help students define and write various styles of written discourse.

The program is based on a whole language rationale and insures that students read and verbalize complete stories or content area selections before "booting-up" the program disk. It provides vocabulary skill development after student reading and network building and uses the graphic display as a nonverbal, holistic model in several major styles of written discourse (Narration, Sequential and Content Area writing) . It does not, however, replace the teacher or diminish that role. Throughout the writing process, the classroom teacher remains the guiding spirit, helping the student expand on his/her ideas and indicating better ways of communicating those ideas to others. The Think Network approach also provides a perfect mechanism for Chapter 1 teachers and aids to work in total congruence with the classroom teacher.

The Thinking Networks Narration Program uses stories and a Narrative Map to help students organize and write original stories. The Content Area program uses factual articles and a Theme Map to help students develop relationships between facts and present them in a clear and concise written manner.

As in all of the Think Networks programs, the use of a Word Processor and a printer hook-up is highly recommended. In this setting, teacher and peer interaction becomes very important since drafts can be edited and revised via the screen or on a hard-copy. Students take pride in producing good work. One youngster in a New York City school, when given back her printed copy asked, "Can I have three copies?" "Why do you want them, we asked?" "I want to give one to my mother, I want to keep one for myself, and I want to give one to my writing teacher - she ain't never going to believe this!" *[1]

---

[1]* This resource is available through St. John's University's Center for the Study of Learning and Teaching Styles, Utopia Parkway, Jamaica, NY 11439. Write for free brochure.

## VOYAGE OF THE MIMI

In the courseware, "Voyage of the Mimi", a multi media approach is used to stimulate and engage the user. The program teaches students through a variety of media which include audio-visual tapes, hands-on-science experiments, computer simulated activities, and computer directed instruction. Because a film is viewed, those students who prefer to learn in a visual manner are accommodated. Other students who prefer a hands-on tactual approach have the science apparatus available. Students can work in pairs, separately or as a class project.

## WHERE IN THE WORLD IS CARMINE SANTIAGO?

This very popular program is formatted in just about every computer system known. Through the use of a detective/ adventure story theme, the user is taught world geography. The student is required to learn map skills and research information from a world almanac and atlas in a highly motivating educational game layout.

## THE 1988 VOTE CAMPAIGN FOR THE WHITE HOUSE.

The concept of the interactive videodisc will eventually have a tremendous effect on education. The '88 Vote presents the key elements of the 1988 presidential campaign. The courseware utilizes Hypercard stacks that enable students to navigate easily through the vast collection of information, pictures, graphics, speech, animation and other kinds of information stored on videodisc and managed by the computer.

## Computer Managed Instruction

An important computer program that is used by the teacher, not the student, is known as computer-managed instruction. By management we mean providing the teacher with the ability to monitor student learning performance, keep records of that performance, assign learning activities based on individual student mastery needs and learning styles, and ultimately make some sort of

judgment concerning student progress in learning. The computer can play an important part in these instructional management activities.

Computer-managed instruction (CMI) is a set of computer functions, created by a program in which the computer assists the teacher in his/her role as learning manager. A good CMI program enables the computer to monitor the student's learning progress, provides information to the teacher as to how well, how quickly, or whether a student is making progress in a learning sequence, and directs the computer to recommend appropriate study activities through which the student can progress in his or her class-work. Never before in the history of the educational endeavor has a classroom teacher had the ability to follow student progress in such an automatic manner as with computer-managed instruction (Futrell & Geisert, 1984).

Using Computer Managed Instruction to assess student progress and prescribe teaching strategies that meet the needs and accommodate the styles of the learner adds still another tool in helping educators make a difference. One of the major roles of a classroom teacher, aside from direct instruction, is being a manager of instruction. Just as CAI enables the computer to be instructionally effective, CMI enables the computer to serve in a role as an effective manager and monitor of learning. A valuable CMI program manages student learning within a clearly-defined curricular structure that includes criteria-referenced tests and, for our purposes, a way of inventorying student learning preferences. While there are several good CMI software packages on the market, most require the user to load information that is to be used into the computer. This can be a time-consuming task and the reader should seriously consider the use of a scanner to accomplish this chore. The Center for the Study of Learning Styles at the University of St. John's, New York, accesses CMI software developed by Community School District 24, that includes learning style information programed into its basic design.

The development of each individual as an active lifelong learner is essential for our survival as a nation. Technology is a tool that serves the needs of education in a way that no other tool can. When combined with the specific learning preferences of the learner, the micro computer is a powerful new tool indeed. While some

teachers still acknowledge having computer phobia and remain apprehensive about using computers as either an instructional or a management tool, it seems to us that the importance of knowing how to be an effective computer user in this information society is much too critical a survival skill to let a lack of technological training get in the way. Educators concerned with improving our schools must make more effective use of the resources that have proven successful. Computer assisted instruction and interactive programs such as the ones noted above represent a major step in the right direction. Programs that utilize the concept of computer-managed instruction that include prescriptive learning style information must become common place in our schools. Those concerned with the improvement of instruction in our nation's classrooms need to become more knowledgeable about the benefits of combining computer use with learning preferences.

## References


Annotated Bibliography. (1990). St. John's University's Center for the Study of Learning and Teaching styles, Utopia Parkway, Jamaica, New York 11439.

Applebee, A.N., Langer, J.A., & Mullins, I.V. (1986), The Writing Report Card: Writing Achievement in American Schools, Princeton, N.J.: Educational Testing Service.

Dunn, R (1987). Research on instructional environments.: Implications for students achievement and attitudes. Professional School Psychology, 2(1), 43-52.

Dunn, R., and Dunn, K. (1978). Teaching students through their individual learning styles, Englewood Cliffs, NJ: Prentice-Hall, Inc.

Futrell, M.K., and Geisert, P. (1984). The well-trained computer. Englewood Cliffs, NJ: Educational Technology Publications.

Kroon, D. (1985). An experimental investigation of the effects on

academic achievement and the resultant administrative implications of instruction congruent and incongruent with secondary, industrial arts students' learning style perceptual preference. (Doctoral dissertation, St. John's University, 1985). Dissertation Abstracts International, 46, 11A.

Martini, M. (1986). An analysis of the relationships between and among computer-assisted instruction, learning style perceptual preferences, attitudes, and the science achievement of seventh grade students in a suburban New York school district. (Doctoral dissertation, St. John's University, 1986). Dissertation Abstracts International, 47, 877A.

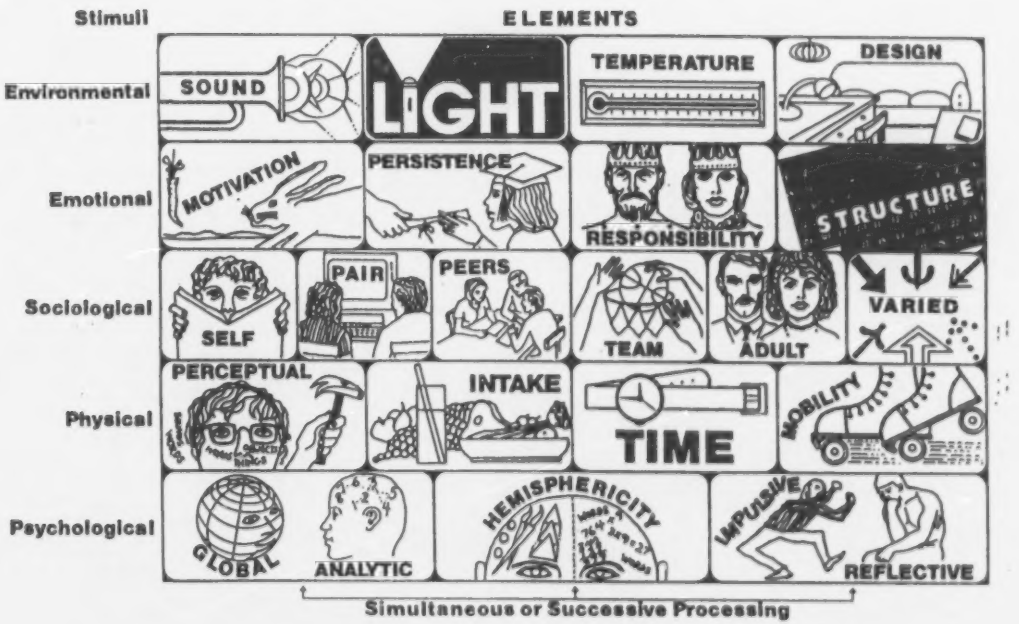


FIGURE 1
Learning Styles Model (designed by Rita Dunn and Kenneth Dunn)



BEST COPY AVAILABLE